



9th Annual PulseNet Update Meeting, Seattle, WA



2004 Accomplishments and 2005 Objectives

Bala Swaminathan, Ph.D.
Centers for Disease Control and
Prevention

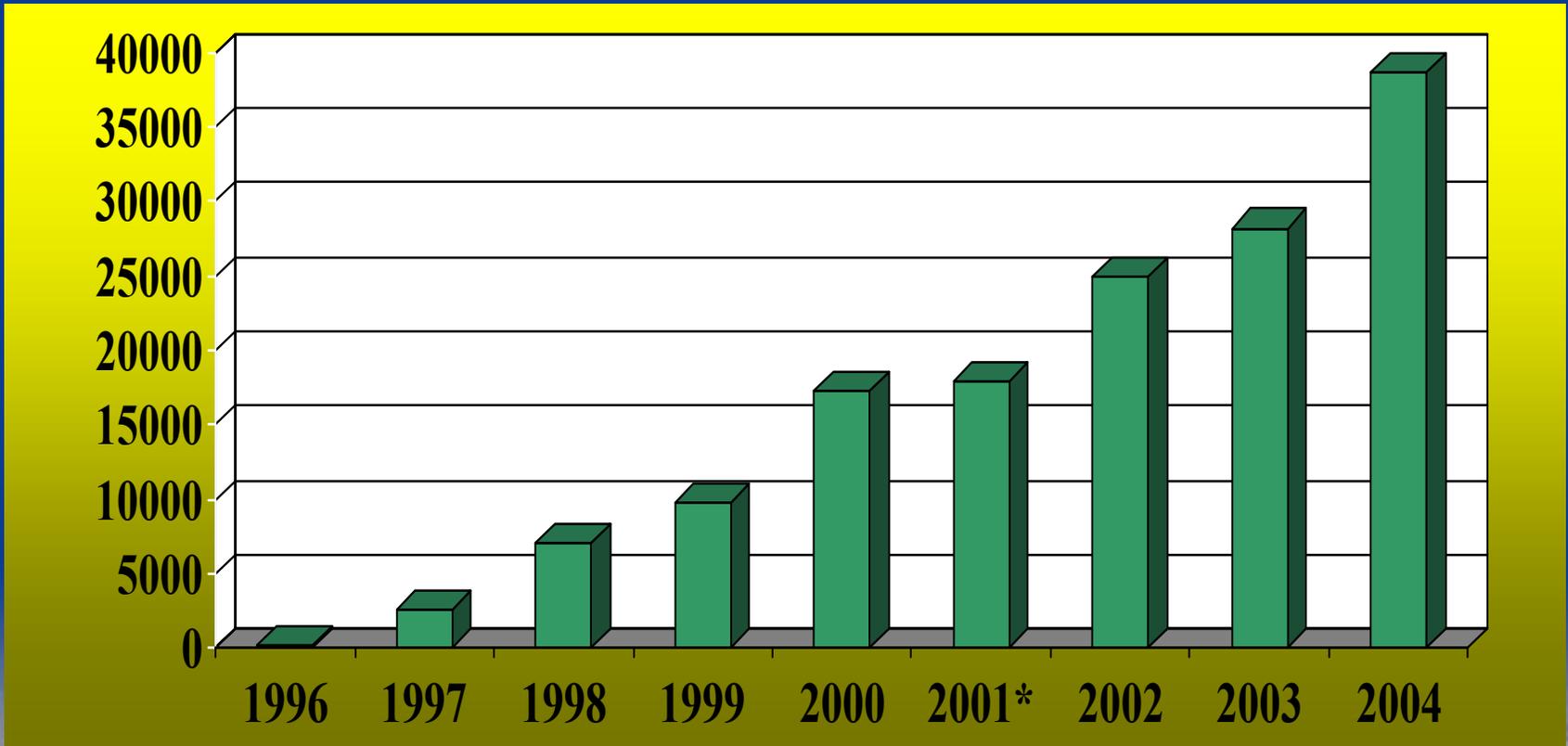
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PulseNet Activity, 1996-2004



PFGE patterns submitted to PulseNet Databases



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2004 PFGE Pattern Submissions



- ◆ 38,682 PFGE patterns submitted to PulseNet databases in 2004, an increase of 37% over 2003 submissions
- ◆ Increases in the 4 major pathogens
 - *E. coli* 37%
 - *Salmonella* 25%
 - *Listeria* 41%
 - *Shigella* 17%
- ◆ 18,729 of 38,682 (48.4%) of submissions in 2004 were electronic submissions to the databases (**This is a PART measure for CDC that OMB evaluates. We exceeded the goal for 2004**)
 - 27% increase over electronic submissions in 2003



Clusters investigated by the PulseNet Task Force at CDC



Pathogen	2003	2004	% Increase
STEC O157	16	33	106
<i>L. monocytogenes</i>	7	15	114
<i>Shigella</i>	7	12	71
<i>Salmonella</i>	88	128	46
<i>Campylobacter</i>	5	9	80
Total	123	197	60



Progress in Next Generation Subtyping Methods for PulseNet



- ◆ MLVA for *E. coli* O157:H7 is undergoing optimization at CDC
- ◆ MLVA for *S. Typhimurium* is being optimized at MN DOH
- ◆ Prospective evaluation of both methods in progress
- ◆ Work continues on MLVA for *S. Enteritidis* and *L. monocytogenes*
- ◆ Work is in progress on SNP-based typing of *E. coli* O157:H7

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Web Service Tool for automated cluster detection

- ◆ Daily cluster finding
- ◆ Search for pattern numbers in PulseNet database by isolate ID
- ◆ Frequency and geographic information on specific patterns
- ◆ Graphical representation of data

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Template - Microsoft Internet Explorer

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Address



Admin Query Labs

[Daily Outbreak](#)
[Isolate Search](#)
[Outbreak Search](#)

Pathogen

Select a Day

February 2005

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	1	2	3	4	5
6	7	8	9	10	11	12

Template - Microsoft Internet Explorer

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Isolate Number	Outbreak Source	Country	Source State	Source Type	IsolatDate	UploadDate	UploadModifiedDate	Serotype	PFGE-Xbal-pattern	PFGE-Xbal-status	PFGE-pattern
MI_05ST000141	USA	MI	Human	2005-02-06	2005-02-15			E. coli O157:H7	EXHX01.2585	Confirmed	EXHA
CDC_K1508-C4	USA				2005-02-15	2005-02-15		E. coli O128:H12	EXHX01.17102@ST	Unconfirmed	EXHA
CDC_K1510-C8	USA				2005-02-15	2005-02-15		E. coli O128:H12	EXHX01.17102&ST	Unconfirmed	EXHA
CDC_K1504-C3	USA				2005-02-15	2005-02-15		E. coli O15:H18 EAagg	EXHX01.17101@ST	Unconfirmed	EXHA
CDC_K1516-C3	USA				2005-02-15	2005-02-15		E. coli O15:H18 EAagg	EXHX01.17101&ST	Unconfirmed	EXHA
CDC_K1529-C1	USA				2005-02-15	2005-02-15		E. coli O15:H18 EAagg	EXHX01.17101&ST	Unconfirmed	EXHA
CDC_K1508-C3	USA				2005-02-15	2005-02-15		E. coli O15:H18 EAagg	EXHX01.17101&ST	Unconfirmed	EXHA
CDC_K1504-C1	USA				2005-02-15	2005-02-15		E. coli O6:H18 LT/ST	EXHX01.17100@ST	Unconfirmed	EXHA
CDC_K1506-C2	USA				2005-02-15	2005-02-15		E. coli O6:H18 LT/ST	EXHX01.17100&ST	Unconfirmed	EXHA

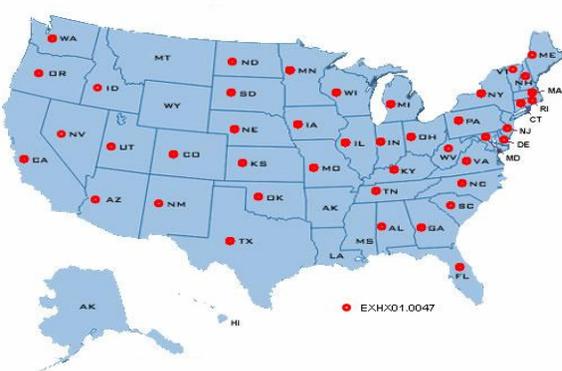
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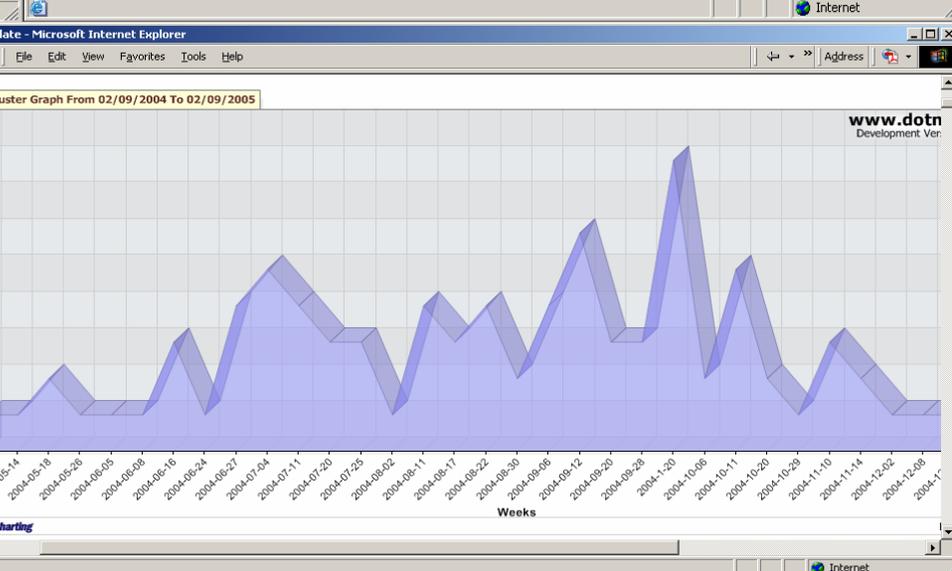
Address

The data in these results should not be published without written permission from the PulseNet database team.

Show Map Show Chart



Done Internet



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Does PulseNet Work?

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New Messages

[All Messages](#) | [45 New](#) | [0 Attn](#)[Welcome to CDC PulseNet](#)[+ General PulseNet Information](#) (4 New)[- Ecoli](#) (2 New)[- ND Cluster Ground Beef Recall](#) (Er)[ND Cluster Ground Beef Recall](#) (Mich)[- E. coli in MN](#) (Dave Boxrud) 06/17/20[E. coli in MN](#) (Denise Toney) 08/21/20[+ Salmonella](#) (24 New)[+ Shigella](#) (1 New)[+ Campylobacter](#) (3 New)[+ Image Acquisition](#) (1 New)[+ WebBoard Comments](#) (7 New)[+ Proficiency Testing/Certification](#) (3 N)[Previous](#) [Next](#) [Previous Topic](#) [Next Topic](#) [Entire Topic](#)
Topic: [E. coli in MN](#) (1 of 37), Read 431 times, 3 File Attachments**Conf:** [Ecoli](#)**From:** [Dave Boxrud](#) dave.boxrud@state.mn.us**Date:** Tuesday, June 17, 2003 09:40 AM

The Minnesota Department of Health is investigating a cluster of two cases of E. coli O157:H7 with the same PFGE type (by two enzymes). Both cases live in northern Minnesota. Onset dates were May 27 and May 28; both cases were cultured on May 31. Both cases have a common exposure of recent consumption of the same brand of steaks. The steaks were purchased frozen and vacuum-packed out of trucks driven by a door-to-door salesman. It is unclear at this time how widely this product may have been distributed. I have attached the bundle and tiff. Bundle file mn03170.bdl contains the Xba1 and Bln1 pattern. The pattern of interest is in lanes 2 and 3 of mn03070.tif (Xba1) and lanes 2 and 3 of mn03173.tif (Bln1). I did a hotlist query and have found recent indistinguishable patterns in Michigan (2 isolates), Kansas and Tennessee (only 1 enzyme done). Please let me know if you have seen this pattern recently. Thank you.

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Centers for Disease Control and Prevention

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(404) 639-3311

This is an official CDC Health Update

Distributed via the Health Alert Network
July 4, 2003, 12:18 EDT (12:18 AM EDT)
CDCHAN-00150-03-07-04-UPD-N

Multistate Outbreak of E. coli O157:H7 infections from steaks

This notice is an update to the press release distributed by the United States Department of Agriculture, Food Safety and Inspection Service (FSIS) on June 29, 2003.

Health authorities in Minnesota have identified three residents with E. coli O157:H7 infection associated with steaks produced by Stampede Meat, Inc. of Chicago Ill. To date, 16 persons with confirmed E. coli O157:H7 infections in 12 states have been associated with the outbreak. Investigators have also isolated the outbreak strain of E. coli O157:H7 from leftover steak consumed by an infected child.

Stampede Meat, Inc. issued a recall on June 29, 2003, of approximately 739,000 pounds of frozen meat produced from March 15 through March 28, 2003. The recall includes 11,000 pounds of

Topic: 0408CO-ml [E.coli O157:H7](#) in CO (1 of 30), Read 165 times, 1 File Attachment **new**
Conf: [Ecoli](#)
From: [Ann Woo-Ming](#) ann.woo-ming@state.co.us
Date: Friday, August 20, 2004 01:53 PM
Originally Posted: 11-Aug-2004 11:26

Hello,
Colorado has a cluster of 4 O157:H7's with matching patterns. The [Xbal](#) pattern is EXHX01.1343. The isolation dates for this cluster are between 7/22-7/25. I've done a 60 day hot list search and found a match from MA and MO. Our [epi](#) contact for this investigation is [Nicole Haubert](#), 303-692-2676.

Thanks,

[Ann Woo-Ming](#)
Colorado Dept of Public Health
8100 Lowry Blvd...
Denver, CO 80230
303-692-3072

[CO04053.BDL \(91KB\)](#)

Within the next few days, additional isolates from OR (2), TX (1), NB (1) and WA (1) were posted to PulseNet and confirmed as matches to the CO cluster. Epidemiologists linked these cases to steak products distributed by an Illinois-based company.



Does PulseNet Work?

Yes

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Does PulseNet Work optimally
And consistently throughout
USA?

No

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PulseNet Gaps

- ❖ Failure to receive isolates in a timely manner from primary laboratory
- ❖ Failure to process isolates in a timely manner in the public health laboratory
- ❖ Failure to submit all DNA “fingerprint” patterns to the National Database in a timely manner
- ❖ Failure to inform epidemiologists in a timely manner
 - Inadequate information provided to epidemiologists



Declining Resources for Public Health



- ◆ Major support for PulseNet activities in state and local public health departments is provided through EIP and ELC
- ◆ May see declines in ELC funding
- ◆ Possible declines in EIP funding

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PulseNet's Role in Bioterrorism Response

- ◆ Direct response to BT – Foodborne biological agents
- ◆ Extending PulseNet to include other potential agents of bioterrorism
- ◆ Leveraging the communication channels of PulseNet

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Leveraging Terrorism Cooperative Agreement



◆ **Goal 1: Decrease the time needed to classify health events as terrorism or naturally occurring, in partnership with other agencies**

- Improve isolate submission by Level A Laboratories
- Enhance capacity to apply standardized molecular epidemiologic methods in real-time

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Leveraging Terrorism Cooperative Agreement



◆ **Goal 2: Decrease the time needed to classify health events as terrorism or naturally occurring, in partnership with other agencies**

- Improve/expedite data sharing on suspected or confirmed cases of foodborne illness between public health epidemiologists, laboratory personnel, and other stakeholders.

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Leveraging Terrorism Cooperative Agreement



- ◆ **Goal 3: Decrease the time needed to detect chemical, biological, radiological agents in tissue, food or environmental samples that cause threats to public's health**
 - If your laboratory does not have the capacity to test FOOD specimens for specific agents used in biological or chemical terrorism, identify appropriate neighboring laboratories that can perform this task, and develop protocols for sending specimens to these laboratories in a food bioterrorism event

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Leveraging Terrorism Cooperative Agreement



◆ **Goal 5: Increase the number of health events reported to CDC**

- Perform real-time subtyping of PulseNet tracked foodborne disease agents
- Promptly* submit the subtype data and associated critical information electronically to the national PulseNet database to facilitate early disease cluster detection.

***Within 72-96 h of receiving isolate
Level A lab; ultimate goal is <48 h**

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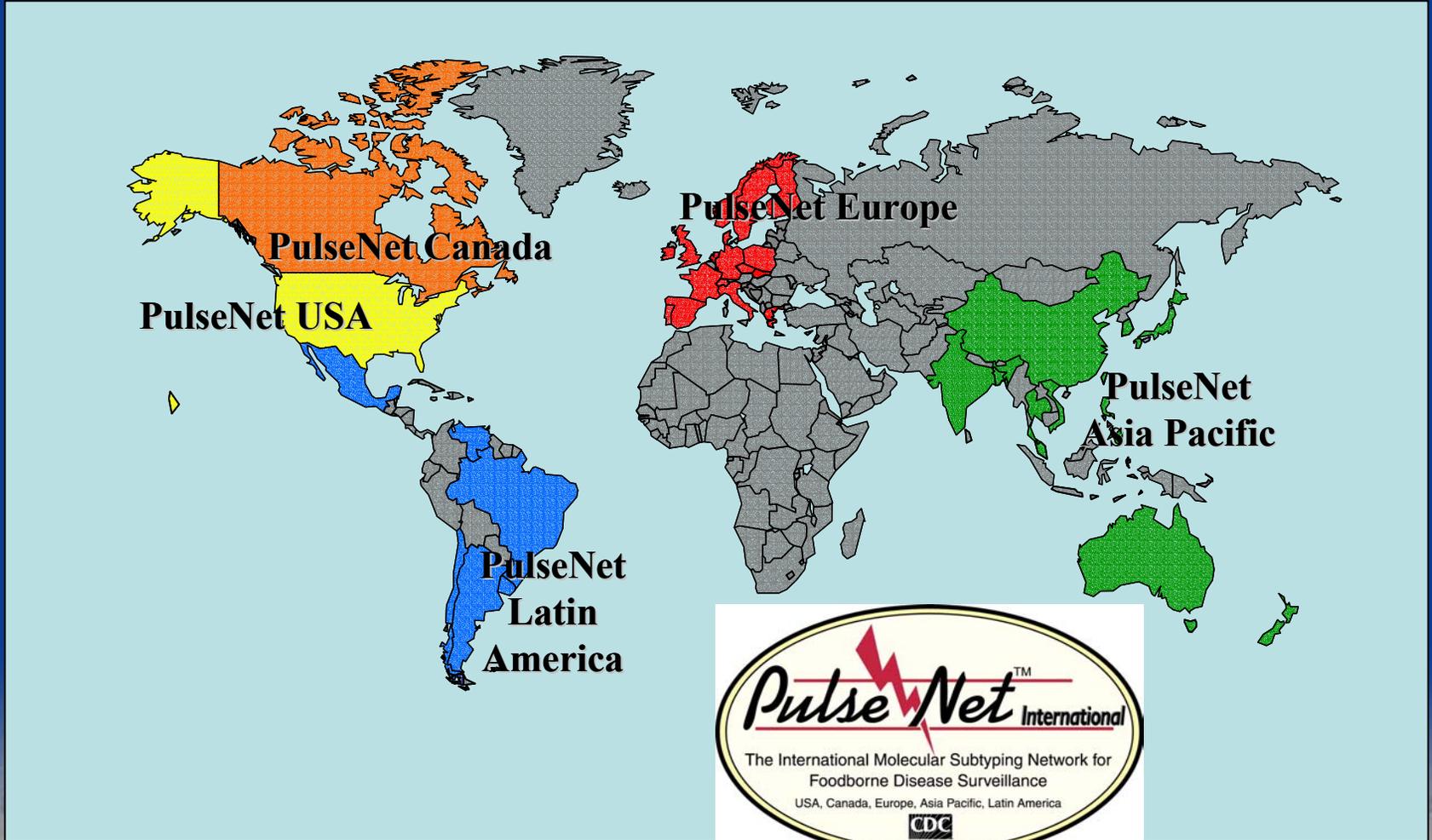


John Besser and APHL played significant roles
in getting these guidelines into the
Guidance for Bioterrorism Preparedness and
Response Funds Utilization document

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PulseNet International



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Why should we go international with PulseNet?



- ◆ We live in a global community
- ◆ Foods produced in one part of the world are consumed in another part of the world, 100's to 1000's of miles away
- ◆ Diseases transmitted through foods should be addressed as a global problem
- ◆ Need an effective global early warning system
- ◆ Global networking and communication will allow us to utilize scarce public health resources effectively
- ◆ Leverage the network to respond to other emerging infectious diseases or acts of bioterrorism

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The Vision for Global PulseNet



Worldwide regional networks utilizing standardized identification and isolate characterization methods and sharing information in real-time to provide early warning on foodborne disease outbreaks, emerging foodborne infections, and acts of food bioterrorism

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- ◆ Infrastructure is being set up
- ◆ Have a robust communication network
- ◆ PulseNet server being set up – subsequent linkage to PulseNet USA server planned
- ◆ Close to agreement on MOU and TOR
- ◆ Continue real-time exchange of data
- ◆ Model for other inter-country networks

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PulseNet Europe



- ◆ September 2004 – EU funding kicked in
- ◆ Database infrastructure has been set up
- ◆ Working on setting up various databases
- ◆ Dr. Susanna Lukinma has replaced Dr. Peter Gerner-Smidt as the coordinator of PulseNet Europe.

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- ◆ Progress documented in a special edition of PulseNet News
- ◆ 2nd PulseNet Workshop conducted in Hong Kong in March 2005
- ◆ *Vibrio cholerae* standardized protocol evaluation – Hong Kong, Japan, Bangladesh working with PulseNet USA
- ◆ NIID, Japan has been successful in obtaining funding to support the network and/or countries that need assistance
- ◆ Strategic planning meeting scheduled for 4th quarter of 2005

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PulseNet Latin America



- ◆ First workshop and strategic planning meeting conducted in Buenos Aires, July 2004; 13 participants from 6 countries (Brazil, Chile, Colombia, Mexico, Uruguay and Venezuela)
- ◆ Second workshop and strategic planning meeting scheduled for June 2005

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***Escherichia coli* O157:H7 Infections Associated with Ground Beef from a U.S. Military Installation — Okinawa, Japan, February 2004**

In February 2004, the Okinawa Prefectural Chubu Health Center (OCHC) and the Okinawa Prefectural Institute of Health and Environment (OIHE), Japan, investigated three cases of *Escherichia coli* O157:H7 infection in a Japanese family associated with eating ground beef. Public health officials from multiple agencies in Japan and the United States collaborated on this investigation, which resulted in a voluntary recall of approximately 90,000 pounds of frozen ground beef in the United States and at U.S. military bases in the Far East. This was the first reported instance in which Japanese public health officials identified contaminated, commercially distributed ground beef that was produced in the United States. This report summarizes epidemiologic and laboratory investigations conducted by OCHC and OIHE. The results underscore the importance of using standardized molecular subtyping methods throughout the world to facilitate international public health communication and intervention.

Cases were ascertained through surveillance for laboratory-confirmed *E. coli* O157:H7 infection. Laboratory investigation of implicated food items was conducted using methods

The frozen ground beef patties eaten by the family were purchased from a U.S. military commissary in Okinawa. OCHC obtained the remaining frozen ground beef patties from the family and sent a sample to OIHE for laboratory evaluation; *E. coli* O157:H7 was isolated from the ground beef patties. Epidemiologic and laboratory findings were reported by the Okinawa Prefecture to the U.S. Naval Hospital in Okinawa. To exclude the possibility that the patties were contaminated after opening, the U.S. Naval Hospital obtained unopened frozen ground beef patties with the same lot number from the base commissary for microbiologic analysis; *E. coli* O157:H7 was isolated from these previously unopened ground beef patties. Isolates from the unopened package, leftover ground beef patties, and the three human isolates had indistinguishable PFGE patterns. The pattern had not been previously observed in Japan or in the PulseNet USA database.

Results of the investigations indicated that the source of infections was contaminated ground beef patties obtained from the U.S. military base in Okinawa. Traceback of the lot number indicated that the frozen patties were produced on August 11, 2003, by a U.S. company. Fresh and frozen ground beef products produced on that day were distributed to U.S. military installations in the Far East and to institutional and retail outlets in California, Idaho, Oregon, and Washington.

As a result of this investigation, the Food Safety Inspection



PulseNet's Role in Outbreak Investigation



- ◆ 2/2004: 3 cases identified by OCHC, Japan
- ◆ Family purchased frozen ground beef patties from U.S. Military Commissary
- ◆ PulseNet Japan performs PFGE using PulseNet protocol
- ◆ PulseNet Japan sends query to PulseNet USA re: PFGE pattern
- ◆ Pattern is not in PulseNet USA database



PulseNet's Role in Outbreak Investigation



- ◆ PulseNet USA posts Japan pattern on WebBoard
- ◆ CA state public health laboratory reports matches
- ◆ Epidemiologic investigations begins
- ◆ Additional cases identified in Idaho, Oregon and Washington
- ◆ Trace back identifies specific lot produced by U.S. company on August 11, 2003
- ◆ 90,000 lb product recalled

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International Outbreak of Shigellosis, 2004





PulseNet WebBoard Posting



Address <http://pulsenet.forum.cdc.gov/login>

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WebBoard

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Welcome to CDC PulseNet

- + [2004 PulseNet Update Meeting](#) (28)
- + [2005 PulseNet Update Meeting](#) (3, 1 New) **new**
- + [2005 Update Meeting Agenda Committee](#) (46, 2)
- [BioNumerics Server Status](#) (0)
- + [Important PulseNet Documents](#) (40, 9 New) **new**
- + [General PulseNet Information](#) (174, 13 New) **new**
- + [Ecoli](#) (602, 321 New) **new**
- + [Salmonella](#) (2533, 419 New) **new**
- + [Listeria](#) (123, 16 New) **new**
- [Shigella](#) (288, 15 New) **new**
 - + [Shigella boydii in SD](#) @ 1/28/2005 (6, 10 New) **new**
 - + [Shigella sonnei in CO](#) @ 11/19/2004 (13, 9 New) **n**
 - + [Michigan S. sonnei outbreak](#) @ 10/28/2004 (15)
 - + [Texas Shigella sonnei](#) @ 10/8/2004 (17)
 - + [European S. sonnei isolates](#) @ 10/8/2004 (8)
 - [S. sonnei cluster-MN](#) @ (Dave Boxrud) 9/9/2004
 - [S. sonnei cluster-MN](#) (Ravi Pallipamu) 9/3/2004
 - [S. sonnei cluster-MN](#) (Dana Tamashiro) 9/5/2004
 - [S. sonnei cluster-MN](#) (Ravi Pallipamu) 9/13/2004
 - [S. sonnei cluster-MN](#) (Stephen Dietrich) 9/7/2004
 - [S. sonnei cluster-MN](#) (Alison Houston) 9/7/2004
 - [S. sonnei cluster-MN](#) (John Bahre) 9/7/2004
 - [S. sonnei cluster-MN](#) (Eileen Prentice) 9/7/2004
 - [S. sonnei cluster-MN](#) (Tia Moore) 9/7/2004

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Topic: S. sonnei cluster-MN (1 of 26), Read 233 times, 3 File Attachments

Conf: [Shigella](#)

From: [Dave Boxrud](#) dave.boxrud@state.mn.us

Date: Thursday, September 09, 2004 03:03 PM

Originally Posted 3-Sep-2004 16:44

We have a recent cluster of 4 isolates of *S. sonnei*. The range of the collection dates are 8/10/04-8/25/04. We have never seen this pattern previous to this cluster. It is possible this cluster may be related to travel. I did a national database 60 day hotlist and found many isolates that appear to match with Xba1. States with at least 1 match to this pattern are: NJ, MA, TN, LA county, MI, UT, OK, Houston county, CO, TX and RI. I have attached a bundle (mn04324.bdl) and a tiff (mn04324-lane 2, H9812 is in lanes 1, 6 and 8). Our epidemiologists working on this cluster are Steve Swanson (steve.swanson@health.state.mn.us, 612-676-5592) and Stephanie Wedel (stephanie.wedel@health.state.mn.us, 612-676-5824). Thanks I have attached the Bln1 pattern of this outbreak. There are 3 slightly different pattern which are all included in this bundle. The bundle file is MNsonn.bdl

Dave Boxrud

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[MN04324.TIF \(160KB\)](#)

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Shigellosis associated with meals served on Airline N



- ◆ 9/3/04: PulseNet WebBoard posting by MN PHL
- ◆ HI, MI, WA, UT, HOU, SDC, LAC, MA, and NJ respond to posting identifying matches
- ◆ OH child hospitalized after return from HI via MN
- ◆ 12 confirmed *S. sonnei* infections in Japan
- ◆ PulseNet USA and PulseNet Japan compare patterns - indistinguishable



2005 Goals - Participants



- ◆ Participants increase proportion PFGE patterns submitted electronically to PulseNet databases to 60%
- ◆ Participants upload DNA “fingerprint” patterns and associated information for all isolates that they have run
- ◆ Participants subtype all NARMS isolates
- ◆ Participants use the same identifiers for NARMS and PulseNet submissions

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2005 Goals - CDC

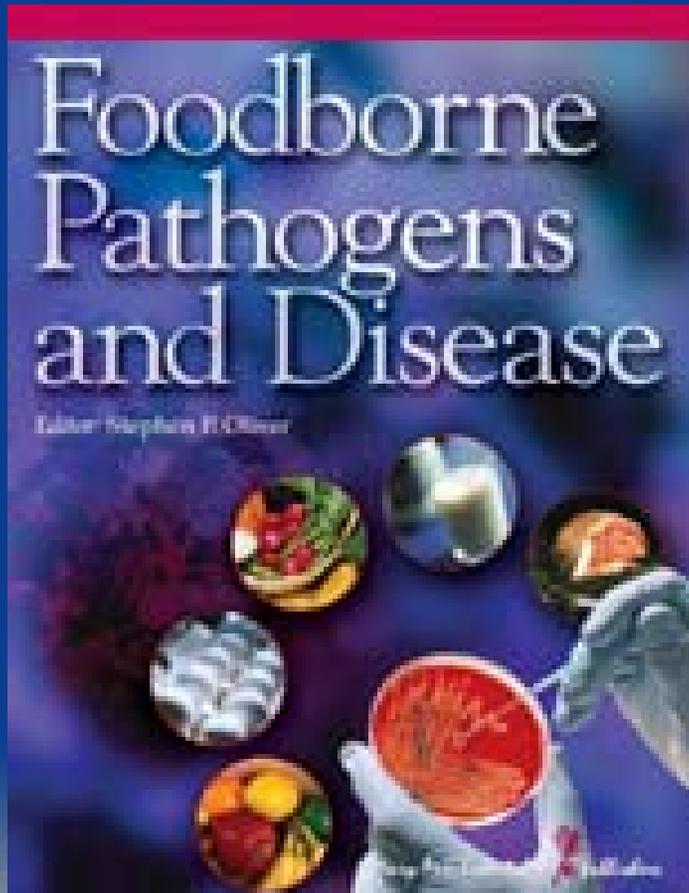


- ◆ Make Web Portal accessible for routine use by PulseNet participating laboratories and epidemiologists
- ◆ Implement SiteScape for improved communications among PulseNet participants
- ◆ Distribute new Masterscripts for *Yersinia pestis* (CDC, Ft. Collins) and *Vibrio cholerae*
- ◆ Perform collaborative evaluation and validation of MLVA for *E. coli* O157:H7 and *S. Typhimurium*

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Special PulseNet Issue Planned for March 2006



This new peer-reviewed, international journal publishes original papers and short communications on research and diseases caused by foodborne pathogens. Topics include emerging pathogens; emergence of drug resistance; methods and technology for rapid and accurate detection; strategies to destroy or control foodborne pathogens in food production and processing; and development of novel strategies for the prevention and control of plant and animal diseases that impact food safety. The Journal will include timely reviews and special reports on topics such as agroterrorism and the safety of organically grown and genetically modified foods.

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Acknowledgements

- ◆ Peter Gerner-Smidt, M.D., Ph.D.
- ◆ Kelley Hise
- ◆ Susan Hunter
- ◆ Desmond Jennings
- ◆ Molly Joyner
- ◆ Jennifer Kincaid
- ◆ Eija Trees

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PulseNet

PulseNet is a national network of public health and food regulatory agency laboratories coordinated by the Centers for Disease Control and Prevention (CDC). The network consists of: state health departments, local health departments, and federal agencies (CDC, USDA/FSIS, FDA).



PulseNet participants perform standardized molecular subtyping (or "fingerprinting") of foodborne disease-causing bacteria by pulsed-field gel electrophoresis (PFGE). PFGE can be used to distinguish strains of organisms such as *Escherichia coli* O157:H7, *Salmonella*, *Shigella*, *Listeria*, or *Campylobacter* at the DNA level. DNA "fingerprints," or patterns, are submitted electronically to a dynamic database at the CDC. These databases are available on-demand to participants—this allows for rapid comparison of the patterns.

PulseNet Highlights

- Learn more about "[PulseNet: The Exhibit](#)", which opened in the Global Health Odyssey of the CDC on October 5, 2004.

Objectives

- Detect foodborne disease case clusters by PFGE
- Allow for real-time communication among state, local health departments, and international partners
- Facilitate early identification of common source outbreaks
- Help food regulatory agencies identify areas where implementation of new measures are likely to increase the safety of our food supply

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<http://www.cdc.gov/pulsenet/index.htm>